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## MICROSCOPES AT THE LOAN COLLECTION OF SCIENTIFIC APPARATUS OF THE SOUTH KENSINGTON MUSEUM.

BY JOHN NICHOLS.

AMONG the relics of early microscopy, the compound microscope, invented and constructed about 1590, by Zacharias Janssen, of Holland, is certainly a very primitive affair. As this, and in fact all the other instruments are inclosed in a glass case, a critical examination is impossible. The outward form presents the simple appearance of an iron or tin tube about ten inches long and about an inch and one half in diameter; the magnifying power is very moderate.

In the same case is a silver microscope, by Anthony van Leeuwenhoek (born 1632, died 1723), the noted Dutch philosopher and microscopist. It may be remembered that he made a microscope for almost every object, which must have consumed much of his valuable time. This microscope of Leeuwenhoek's is simple in form, being a silver plate, perforated with a single minute hole, in which is fixed a tiny lens, in front of which, and in focus, is placed a silver needle upon which the object was fixed.

It was with such an instrument that Leeuwenhoek carried on his wonderful discoveries, and laid the first steps in histological science. What glorious results might have followed had he possessed a modern instrument and objectives!

The great microscope made by Benjamin Martin (1770), for George the Third, is probably the largest and most elaborate instrument ever manufactured. It stands nearly three feet high, and is decorated with much scroll-work, while in all directions are lying the most complicated pieces of accessory apparatus, which must have sorely bewildered the royal scientist. Looking at this piece of scientific magnificence, some comfort is suggested, that if we have not yet reached perfection in designing microscopes, we have at least attained a good degree of simplicity of construction.

There are many other instruments made by the early microscopists, illustrating the progress of the instrument. That made for or by Galileo is of special historical interest. The glasses have been lost; the tube alone remains. The body is an upright, supported on a tripod.

The modern instruments offer no field for comment. One looks in vain for anything novel in construction. There are the

well-known forms of the different makers enclosed in glass cases. Probably the London shop-windows present as great a variety in microscopes as this section of the collection. The instruments are all muddled together without any order or attempted arrangement.

Powell and Lealand do not exhibit. Messrs. Ross & Company exhibit a large instrument on the Jackson slide principle, designed by Mr. F. H. Wenham. The great point in this form is, that the fine adjustment is placed under the instrument, and can be reached without taking the hand from the coarse adjustment. Thus the old objection to this model has been removed. Messrs. R. & J. Beck also have one of their best microscopes, showing great perfection of work; also a cheap form called "The Economic." It is monocular, highly finished, and is altogether a charming instrument and furnished for five and six guineas, with objectives and case.

Mr. Stephenson exhibits his erecting binocular microscope, for which he claims many decided advantages, which should make it extremely useful. The instrument of the future, the comfort of looking through inclined tubes and still having the stage horizontal, and the image in its natural position, certainly marks a great advance in construction.

Mr. J. Browning shows a microscope upon the same model, but with what is claimed to be an improvement. In this instrument, for the first time, the planes introduced by Mr. Stephenson for altering the direction of the rays, so that the microscope can be used with the stage in a horizontal position, have been introduced near the eye-piece in the separate bodies. This arrangement will, it is believed, be found to possess considerable advantage. Such is the official description, which must be taken for granted, as the exterior presents no novel feature.

Swift, who is turning out some of the best moderate-priced optical instruments in London, shows a microscope very similar to Messrs. Beck's "Economic," called the "New College Microscope." Also a new crane arm-binocular. This is an excellent full-sized instrument, and for a good, working microscope, appears all that can be desired, and sold with good objectives at a price within the reach of the student microscopist.

The German manufacturers have sent a few instruments, and are chiefly represented by Messrs. Tiebert and Krafft, and E. Leitz, both of Wetzlar. Respecting these microscopes I noticed nothing special, except that they appeared inferior in workmanship to those exhibited by the London makers.

Among accessory apparatus will be found that used by Messrs. W. H. Dallenger, and J. J. Drysdale, M. D., for the continuous observation of minute organisms. Those who read the *Monthly Microscopical Journal*, know what valuable results were obtained by its use. Would that the faculty to make use of instruments could be sold to the many purchasers.

Microtomes, for cutting sections, are here in great variety and of all sizes. One with a marble basin larger than an ordinary washing-basin. In some of the microtomes the knife is fixed and worked by a piece of mechanism like a lathe rest, such as that made by W. Apel, mechanician to the University of Göttingen. In another microtome the preparation is pressed forward by a micrometer screw, against a circular knife, set in motion by a lathe. This instrument is from the University of Prague.

United States opticians and manufactures are totally unrepresented, which is much to be regretted, as in this section they could have made an excellent show, — perhaps have carried off the palm.

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#### MIMICRY IN BUTTERFLIES EXPLAINED BY NATURAL SELECTION.

FRITZ MÜLLER, whose contributions to science are always worthy of special attention, endeavors in a recent German periodical<sup>1</sup> to show how the phenomena of mimicry in butterflies may be explained by the theory of Natural Selection. He bases his inquiries upon the species of *Leptalis* found in southern Brazil, and although, as will appear below, he adduces reasons for believing the primitive stock to have been banded, and not like most of the family to which this genus belongs, simple white butterflies, he commences by showing how even such an extreme change could be wrought out by the survival of the fittest in the struggle for existence.

“Should,” he remarks, “the first unimportant variations from the original white color (of the Pierids) be useful only in attracting to their possessors, at a little shorter distance, the attention of enemies flying carelessly overhead, they would become more and more useful, and cause their possessors to become continually more abundant in proportion to the type; they could therefore serve as the basis for the gradual formation of a resemblance fit to deceive even the sharp eyes of birds scanning the swarms of *Ithomias* (the butterflies imitated by some *Leptalids*) for booty.”

<sup>1</sup> Jenaische Zeitschrift für Naturwissenschaft, x. i., February, 1876.